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Service Change Notice 17-59 Updated
National Weather Service Headquarters Silver Spring MD
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To: Subscribers
             -NOAA Weather Wire Service
             -Emergency Managers Weather Information Network
             -NOAAPORT
             Other NWS Partners, Users and Employees

From: Dave Myrick
             NWS Office of Science and Technology Integration

Subject: Updated: Slight adjustments to SBN and NOMADS
             transmission of National Blend of Models (NBM)
             guidance and bug fix effective on October 10, 2017

Updated to send more output for the 0500 UTC, 0600 UTC, 1700 UTC
and 1800 UTC cycles to provide information earlier for
Continental U.S. (CONUS) Weather Forecast offices (WFO) in the
Central and Eastern time zones.

Currently, the 0500 and 1700 UTC NBM runs are transmitted
through 84 hours on SBN. Based on feedback from CONUS
WFOs/Regions in Central and Eastern time zones, additional
Satellite Broadcast Network (SBN) transmissions through
187 hours are needed for those two runs to be effectively used
in the primary forecasts issued by roughly 300 am/pm local time.

In addition, the 0600 UTC and 1800 UTC MaxT MinT MaxRH and MinRH
fields are transmitted currently to 72 hours. These will be
transmitted on the SBN to 264 hours, an hour earlier than
currently done on the 0700 UTC and 1900 UTC cycles. For
reference, SBN transmissions are roughly 1 hour later than the
NBM cycle times listed above (i.e., the NBM 0500 UTC run cycle
is available in the Advanced Weather Interactive Processing
System (AWIPS) via SBN by about 0600 UTC).

An error was also recently discovered, preventing blending of
88-h temperature and 94-h QPF06 on the 0200, 0800, 1400 and 2000
UTC NBM cycles. This error also impacted the 131-h wind gust at
0400, 1000, 1600, and 2200 UTC NBM cycles. With this error
corrected, the elements listed above will now begin populating
in GRIB2 data flow to Web Dissemination and NOAA Operational
Model Archive and Distribution System (NOMADS). There are no
changes to SBN/NOAAPORT with this fix.

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On or about Thursday, July 27, 2017, beginning with the
1200 Coordinated Universal Time (UTC) model run, the NWS
Meteorological Development Laboratory (MDL) will implement an

update to the experimental NBM guidance over the CONUS, OCONUS (Alaska, Hawaii, Puerto Rico), and Oceanic National Digital Forecast Database (NDFD) domains.

1. Background

This upgrade will incorporate additional global and mesoscale models over the CONUS and OCONUS domains. The upgrade will enable the NBM to routinely generate key aviation weather elements for digital aviation services, fire weather and several meteorological fields used to derive a predominant weather grid at local Weather Forecast Offices. The location and cycle availability of all NBM products is outlined in Sections 4-6 below.

2. NBM Elements

A list of weather elements that will be available at hourly time steps through 36 hours is provided below:

    1. 2-m temperature
    2. 2-m dewpoint
    3. 10-m wind speed
    4. 10-m wind direction
    5. 10-m wind gust
    6. Sky Cover
    7. Ceiling height (CONUS Only)
    8. Lowest cloud base height (CONUS Only)
    9. Visibility (CONUS Only)
   10. Precipitation potential index (CONUS Only)
   11. Quantitative precipitation amount (1-hour, CONUS Only)
   12. 2-m relative humidity (NDGD only, No SBN)
   13. 2-m apparent temperature (NDGD only, No SBN)

The following NBM weather elements will be available over the CONUS and OCONUS domains at 3-hour time steps between 39-192 hours and every 6 hours thereafter through 264 hours:

    1. 2-m temperature
    2. 2-m dewpoint
    3. Daytime 2-m Maximum temperature
    4. Nighttime 2-m Minimum temperature
    5. 10-m wind speed
    6. 10-m wind direction
    7. 10-m wind gust
    8. Sky Cover
    9. Precipitation potential index (6-hour)
   10. Probability of precipitation (12-hour)
   11. Quantitative precipitation amount (6-hour)
   12. 2-m Maximum relative humidity (12-hour)
   13. 2-m Minimum relative humidity (12-hour)
   14. 2-m relative humidity (NDGD only, No SBN)
   15. 2-m apparent temperature (NDGD only, No SBN)

For CONUS only, the following NBM weather grid elements will be
available at hourly time steps between 1-36 hours, every 3 hours
between 36-192 hours, and every 6 hours through 264 hours:

    1. Maximum wet-bulb temperature aloft
    2. Bourgouin positive area/energy
    3. Bourgouin negative area/energy
    4. Probability of cloud ice present
    5. Conditional probability of rain
    6. Conditional probability of snow
    7. Conditional probability of freezing rain
    8. Conditional probability of sleet
    9. Conditional probability of refreeze sleet
   10. Snow-liquid ratio
   11. Snow level
   12. 3-h prob. of a thunderstorm (3-hourly, 3-78 hours)
   13. 6-h prob. of a thunderstorm (6-hourly, 84-180 hours)

3. This upgrade will incorporate additional global and mesoscale
models and statistically post-processed guidance over the CONUS
and OCONUS domains:

Current inputs:

    1. NAM (North American Mesoscale Forecast System - 12km)
    2. NAMNest (NAM 3km high resolution nest)
    3. GFS (Global Forecast System)
    4. GEFS (Global Ensemble Forecast System)
    5. GDPS (CMC - Environment Canada Global Deterministic –
        PoP12/QPF06 only)
    6. GEPS (CMCE - Environment Canada Global Ensemble)
    7. EKDMOS (Ensemble Kernel Density Model Output Statistics)
    8. Gridded GFS MOS (GMOS or MOSGuide)

New inputs:

    9. HRRR (High Resolution Rapid Refresh), CONUS only
   10. RAP (Rapid Refresh)
   11. Gridded LAMP (GLMP Localized Aviation MOS Product), CONUS
        only)
   12. HiResWindow ARW NCEP (High-Resolution Window Forecast
        System (HIRESW))
   13. HiResWindow NMMB NCEP (High-Resolution Window Forecast
        System (HIRESW))
   14. SREF (Short Range Ensemble Forecast) CONUS, Alaska,
        Puerto Rico sectors
   15. NAVGEME (Navy FNMOC Global Ensemble)

The CONUS NBM products will be disseminated on a 2.5-km Lambert
Conformal grid with dimensions NX=2345 and NY=1597. This
represents an expansion to the west by 200 grid lengths compared
to the current operational NBM domain to provide coverage for
the Nearshore Wave Prediction Model (NWPS) along the
U.S. West Coast.

NBM products for Alaska will be produced on a 3-km Polar
Stereographic grid with dimensions NX=1649 and NY=1105. The
Hawaii NBM products will be produced on a 2.5-km Mercator grid
with dimensions NX=625 and NY=561. Products for Puerto Rico will
be produced on a 1.25-km Mercator grid with dimensions NX=353
and NY=257.

4. NBM Oceanic Products

NBM guidance for the Oceanic domain will now incorporate all
ensemble members from the Global Ensemble Forecasting System
(GEFS) and the Canadian Meteorological Centre Ensemble (CMCE).
This upgrade provides additional 10-m wind speed percentile
thresholds and a blended wind direction field using a clustering
technique. The Oceanic products will continue to be produced on
a 10-km Mercator grid with dimensions NX=2517 and NY=1817.
Guidance for the following elements will be available for the
0000 and 1200 UTC cycles at 3-hourly time steps between 3-192
hours and at 6-hourly time steps thereafter through 264 hours:

        1. 10-m wind speed 10th Percentile
        2. 10-m wind speed 25th Percentile
        3. 10-m wind speed 50th Percentile
        4. 10-m wind speed 75th Percentile
        5. 10-m wind speed 90th Percentile
        6. 10-m blended wind direction

Please note that these additional calculations are resource
intensive and results in a 40 minute runtime delay relative to
the current operational NBM oceanic product.

5. SBN/NOAAPORT Dissemination

While the NBM will run every hour and produce output to
264 hours with each run, only a subset will be sent across the
Satellite Broadcast Network (SBN) and NOAAPORT due to bandwidth
limitations. Products will be disseminated in GRIB2 format and
will contain individual WMO headers. On implementation day,
current NBM products going across the SBN/NOAAPORT will no
longer contain superheaders. The schedule for SBN/NOAAPORT
dissemination is as follows:

NBM Window	Disseminated Cycles (UTC)
Short-term: 1-18h	0100, 0200, 0400, 0800, 1000, 1100,
	1300, 1400, 1600, 2000, 2200, 2300
Short-term: 1-36h	0300, 0600, 0900, 1500, 1800, 2100
Short-term and medium-range: 1-187h	0500, 1700

```
    Short-term and
    extended-range: 1-264h        0000, 0600*, 0700, 1200, 1800*,
1900

    Oceanic products -
    through 264h                  0000, 1200
```

*For 0600 and 1800 UTC, only MaxT MinT MaxRH MinRH transmitted
to 264 hours; other elements just to 36 hours.

6. TGFTP/NDGD Dissemination

Output for the 0000, 0700, 1200 and 1900 UTC cycles will be
placed in the experimental area of the National Digital Guidance
Database (NDGD) in GRIB2 format at the following locations:

ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.conus/ (CONUS)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.alaska/ (Alaska)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.hawaii/ (Hawaii)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.puertori/ (Puerto Rico)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.oceanic/ (Oceanic)

Each domain directory will contain subdirectories for each valid
period as follows:

```
        VP.001/      Day 1
        VP.002/      Day 2
        VP.003/      Day 3
        VP.004/      Day 4
        VP.005-007/  Days 5-7
        VP.008-450/  Days 8 and beyond
```

Each element-specific GRIB2 file will reside in the appropriate
valid period subdirectory and contain individual WMO headers.
On implementation day, NBM files residing in NDGD will no longer
contain superheaders. A listing of GRIB2 file names for all NBM
elements that will reside on TGFTP is provided in Table 1 below.

Table 1: GRIB2 file names for NBM elements that will reside on
TGFTP/NDGD in the appropriate valid period subdirectory

```
    CONUS/ALASKA/HAWAII/PR PRODUCTS:
    GRIB2 FILE NAME       NBM ELEMENT NAME
    --------------        ----------------------------
    ds.skymean.bin        Sky cover (mean)
    ds.wdirmean.bin       Wind direction (mean)
    ds.wspdmean.bin       Wind speed (mean)
    ds.pop12.bin          12-h probability of precipitation
```

```
    ds.tempmean.bin      2-m temperature (mean)
    ds.tdmean.bin        2-m dewpoint temperature (mean)
    ds.maxtmean.bin      Daytime maximum temperature (mean)
    ds.mintmean.bin      Nighttime minimum temperature (mean)
    ds.qpf06.bin         6-h quant. precipitation amount
    ds.rhmean.bin        2-m relative humidity (mean)
    ds.apptmean.bin      2-m apparent temperature (mean)
    ds.wgustmean.bin     Wind gust (mean)
    ds.ppi.bin           Precipitation potential index
    ds.maxrhmean.bin     12-h maximum relative humidity (mean)
    ds.minrhmean.bin     12-h minimum relative humidity (mean)


    CONUS-ONLY PRODUCTS:
    GRIB2 FILE NAME      NBM ELEMENT NAME
    ---------------      ----------------------------
    ds.pts03.bin         3-h Probability of a thunderstorm
    ds.pts06.bin         6-h Probability of a thunderstorm
    ds.vismean.bin       Visibility (mean)
    ds.cigmean.bin       Ceiling height (mean)
    ds.cldbsemean.bin    Cloud base height (mean)
    ds.qpf01.bin         1-h Quant. precipitation amount
    ds.cprbfzrain.bin    Cond. probability of freezing rain
    ds.cprbsnow.bin      Cond. probability of snow
    ds.cprbrain.bin      Cond. probability of rain
    ds.cprbsleet.bin     Cond. probability of ice pellets
    ds.prbrefzslt.bin    Probability of refreeze sleet
    ds.probcldice.bin    Probability of cloud ice present
    ds.negemean.bin      Bourgouin negative area/energy (mean)
    ds.posemean.bin      Bourgouin positive area/energy (mean)
    ds.slrblend.bin      Snow-liquid ratio (mean)
    ds.snowlvlmean.bin   Snow level (mean)
    ds.maxwbmean.bin     Maximum wet-bulb temp. aloft (mean)


    OCEANIC PRODUCTS:
    GRIB2 FILE NAME      NBM ELEMENT NAME
    ---------------      ----------------------------
    ds.wdirmean.bin      Wind direction (mean)
    ds.wspd10p.bin       Wind speed - 10th percentile
    ds.wspd25p.bin       Wind speed - 25th percentile
    ds.wspd50p.bin       Wind speed - 50th percentile
    ds.wspd75p.bin       Wind speed - 75th percentile
    ds.wspd90p.bin       Wind speed - 90th percentile
```

7. NCEP Web Dissemination

On implementation day, the NBM output for all cycles, elements,
and projections will now be made available on NCEP web
services sites:

```
http://nomads.ncep.noaa.gov/pub/data/nccf/com/blend/prod/
http://ftp.ncep.noaa.gov/data/nccf/com/blend/prod/
ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/blend/prod
```

8. WMO Headers

Unique originating center IDs have been assigned to each
geographic region. A listing of the originating center IDs is
given in Table 2 below. WMO headers for all NBM elements and
discontinued superheaders are listed below in Tables 3 and 4,
respectively.

A document outlining the new WMO header scheme for NBM products
can be found here:

   http://www.weather.gov/media/mdl/NBM_WMO_header.pdf

Table 2: List of originating center IDs (CCCC) for NBM products

Two IDs are assigned to each geographic region to accommodate
all weather elements. Oceanic products are disseminated under
KWEA.

    Geographic Region   Originating Center (CCCC)
    -----------------   -------------------------
    CONUS and Oceanic   KWEA and KWEB
    Alaska   KWEC and KWED
    Hawaii   KWEE and KWEF
    Puerto Rico   KWEG and KWEH

Table 3: WMO headers for all NBM products that will be
disseminated over the SBN/NOAAPORT and placed on TGFTP/NDGD

Listed below are representations of the WMO headers where xxx is
a placeholder for the forecast valid day and hour (see header
document linked above for further details).

    CONUS Products (CCCC=KWEA)
    WMO Header   Element Name
    ----------   ----------------------------
      YAAxxx   Sky cover (mean)
      YBAxxx   Wind direction (mean)
      YCAxxx   Wind speed (mean)
      YDAxxx   12-h Probability of precipitation
      YEAxxx   2-m temperature (mean)
      YFAxxx   2-m dewpoint temperature (mean)
      YGAxxx   Daytime maximum temperature (mean)
      YHAxxx   Nighttime minimum temperature (mean)
      YIAxxx   6-h Quant. precipitation amount (mean)
      YJAxxx   6-h Probability of a thunderstorm
      YMAxxx   Precipitation potential index
      YPAxxx   Visibility (mean)
      YQAxxx   Ceiling height (mean)
      YRAxxx   Relative humidity (mean) - NDGD only
      YTAxxx   Apparent temperature (mean) - NDGD only
      YVAxxx   1-h Quant. precipitation amount (mean)
      YWAxxx   Wind gusts (mean)
      YYAxxx   3-h Probability of a thunderstorm

```
CONUS Products (CCCC=KWEB)
WMO Header        Element Name
----------        ----------------------------
  YAAxxx          Cond. probability of freezing rain
  YBAxxx          Cond. probability of snow
  YCAxxx          Cond. probability of rain
  YDAxxx          Cond. probability of ice pellets
  YEAxxx          Probability of refreeze sleet
  YGAxxx          12-h Maximum relative humidity (mean)
  YHAxxx          12-h Minimum relative humidity (mean)
  YIAxxx          Probability of cloud ice present
  YNAxxx          Bourgouin negative area/energy (mean)
  YPAxxx          Bourgouin positive area/energy (mean)
  YQAxxx          Cloud base height (mean)
  YRAxxx          Snow-liquid ratio (mean)
  YSAxxx          Snow level (mean)
  YWAxxx          Maximum wet-bulb temp. aloft (mean)

AK/HI/PR Products (CCCC=KWEC,KWEE,KWEG)
WMO Header        Element Name
----------        ----------------------------
  YAAxxx          Sky cover (mean)
  YBAxxx          Wind direction (mean)
  YCAxxx          Wind speed (mean)
  YDAxxx          12-h Probability of precipitation
  YEAxxx          2-m temperature (mean)
  YFAxxx          2-m dewpoint temperature (mean)
  YGAxxx          Daytime maximum temperature (mean)
  YHAxxx          Nighttime minimum temperature (mean)
  YIAxxx          6-h Quant. precipitation amount (mean)
  YMAxxx          Precipitation potential index
  YRAxxx          Relative humidity (mean) - NDGD only
  YTAxxx          Apparent temperature (mean) - NDGD only
  YWAxxx          Wind gusts (mean)

AK/HI/PR Products (CCCC=KWED,KWEF,KWEH)
WMO Header        Element Name
----------        ----------------------------
  YGAxxx          12-h Maximum relative humidity (mean)
  YHAxxx          12-h Minimum relative humidity (mean)

Oceanic Products (CCCC=KWEA)
WMO Header        Element Name
----------        ----------------------------
  OBAxxx          Wind direction (mean)
  OCCxxx          Wind speed - 10th percentile
  OCMxxx          Wind speed - 25th percentile
  OCGxxx          Wind speed - 50th percentile
  OCNxxx          Wind speed - 75th percentile
  OCKxxx          Wind speed - 90th percentile
```

Table 4: List of WMO superheaders that are being discontinued

Listed below are representations of the superheaders where "ii" represents the valid period of the forecasts (ii=93-98)

    CONUS (CCCC=KWEA):
      LAAZii LBAZii LCAZii LDAZii LEAZii LFAZii
      LGAZii LHAZii LIAZii LRAZii LTAZii LWAZii

    Alaska (CCCC=KWEA):
      MAAZii MBAZii MCAZii MEAZii MFAZii
      MGAZii MHAZii MRAZii MTAZii MWAZii

    Hawaii (CCCC=KWEA):
      ZAAZii ZBAZii ZCAZii ZEAZii ZFAZii
      ZGAZii ZHAZii ZRAZii ZTAZii ZWAZii

    Puerto Rico (CCCC=KWEA):
      YAAZii YBAZii YCAZii YEAZii YFAZii
      YGAZii YHAZii YRAZii YTAZii YWAZii

    Oceanic (CCCC=KWEA):
      HCAZii

Users may find parallel NBM data for download:

http://para.nomads.ncep.noaa.gov/pub/data/nccf/noaaport/blend/
http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/blend/para/

Feedback will be collected through October 27, 2017 via comments provided on the electronic survey at:

  http://www.nws.noaa.gov/survey/nws-survey.php?code=EXPNBM

Any questions, comments or requests regarding this implementation should be directed to the contacts below. We will review any feedback and decide whether to proceed.

For questions regarding the implementation of NBM guidance please contact:

  David Rudack
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  301-427-9475
  Jeffrey.Craven@noaa.gov

For questions regarding the data flow, please contact:

  Carissa Klemmer
  NCEP Central Operations
  301-683-0567

ncep.list.pmb-dataflow@noaa.gov

A web page describing the NBM can be found at:

     http://w2.weather.gov/mdl/nbm_home

NWS National Service Change Notices are online at:

     http://www.weather.gov/os/notif.htm

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